WHAT IS CLAIMED IS:

1. A vertical cavity surface emitting laser, comprising:

a substrate;

a first mirror stack over the substrate;

an active region having a plurality of quantum wells over the first mirror stack;

a tunnel junction over the active region, a p-layer of the tunnel junction including GaPSb or AlGaPSb; and

a second mirror stack over the tunnel junction.

2. A vertical cavity surface emitting laser according to claim 1, wherein an n-layer of the tunnel junction further includes a compound selected from the group consisting of InP, AlInAs, AlInGaAs, InGaAs and InGaAsP.

3. A vertical cavity surface emitting laser according to claim 1, further including an n-type spacer adjacent the active region, and wherein the first mirror stack is an n-type DBR.

4. A vertical cavity surface emitting laser according to claim 1, further including an p-type spacer adjacent the tunnel junction, and wherein the second mirror stack is an n-type DBR.

5. A vertical cavity surface emitting laser according to claim 1, further including:

an n-type bottom spacer adjacent the active region, and wherein the first mirror stack is an n-type DBR; and

an p-type top spacer adjacent the tunnel junction,

wherein the first and second mirror stacks are each an n-type DBR.

6. A vertical cavity surface emitting laser according to claim 1, wherein the p-layer is grown by MOCVD or MBE.

7. A vertical cavity surface emitting laser according to claim 6, wherein the MOCVD grows the p-layer of the tunnel junction using TMAl, TMGa, TMSb and PH_3 in a temperature range between about 400 °C and about 900 °C.

8. A vertical cavity surface emitting laser according to claim 6, wherein the MBE grows the p-layer of the tunnel junction at a condition where the Equivalent Beam Pressures of group V sources are in a range of about 1×10^{-7} to about 1×10^{-3} torr and the growth rates of group III sources are less than about 10 μm/hour.

9. A vertical cavity surface emitting laser according to claim 6, wherein the p-layer is doped with carbon with a concentration greater than about 2×10^{18} cm^{-3}.

10. A vertical cavity surface emitting laser according to claim 1, wherein the active region includes one of InGaAs, InGaAsP and AlInGaAs.

11. A vertical cavity surface emitting laser according to claim 1, wherein the first and second mirror stacks are lower and upper mirror stacks, respectively.

12. A tunnel junction having a p-layer including GaPSb or AlGaPSb.

13. A tunnel junction according to claim 12, wherein the p-layer is doped with carbon with a concentration greater than about $2x10^{18}$ cm^{-3}.

14. A tunnel junction according to claim 12, further including an n-doped layer of a compound in the group consisting of InP, AlInAs, InGaAs, AlInGaAs, and InGaAsP.

15. A tunnel junction according to claim 14, wherein the n-doped layer is doped with a concentration greater than about $2x10^{18}$ cm^{-3}.

16. A tunnel junction according to claim 14, wherein the n-doped layer is less than about 100 nanometers thick.

17. A tunnel junction according to claim 14, wherein the n-doped layer is doped with a concentration greater than about $2x10^{18}$ cm^{-3} and the n-doped layer is less than about 100 nanometers thick.

18. A long wavelength VCSEL, comprising:

an indium-based semiconductor substrate;

a first mirror stack over the substrate;

an active region having a plurality of quantum wells over the first mirror stack;

a tunnel junction over the active region, wherein a p-layer of the tunnel junction includes GaPSb or AlGaPSb; and

a second mirror stack over the tunnel junction.

19. A long wavelength VCSEL according to claim 18, wherein an n-layer of the tunnel junction further includes a compound selected from the group consisting of InP, AlInAs, InGaAs, AlInGaAs and InGaAsP.

20. A long wavelength VCSEL according to claim 18, further including an n-type spacer adjacent the active region, and wherein the first mirror stack is an n-type DBR.

21. A long wavelength VCSEL according to claim 18, further including an p-type spacer adjacent the tunnel junction, and wherein the second mirror stack is an n-type DBR.

22. A long wavelength VCSEL according to claim 18, further including: an n-type bottom spacer adjacent the active region, and wherein the first mirror stack is an n-type DBR; and an p-type top spacer adjacent the tunnel junction, wherein the first and second mirror stacks are each an n-type DBR.